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The Effects of Language Processing Strategies Upon Reading Comprehension

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Eastern Illinois University

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The Effects of Language Processing Strategies

Upon Reading Comprehension
(TITLE)

BY

Kathy Ann Kirby

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Science in Education

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
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The Effects of Language Processing Strategies

Upon Reading Comprehension

Kathy Ann Kirby

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Master of Science in Education

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Abstract

In 1975, the Education for All Handicapped Children Act was passed providing educational services for children with exceptionalities. Learning disabilities was one of those exceptionalities whose definition used a language disorder as its major criteria for the identification and classification of a specific learning disabilities. The inclusion of language disorders within its definition brought about greater interest in language and the understanding of language development, acquisition and processing and how these aspects related with academic learning, particularly with reading.

The purpose of this study was to address the issue of language processing strategies in the remediating of language deficits and to see if this remediation would have a direct effect upon language ability and/or reading comprehension. The population consisted of 18 children from rural east central Illinois whose ages ranges from 7 years, 2 months to 12 years, 10 months. Their education needs ranged from learning disabilities, educable mentally handicapped, remedial reading to tutorial help. The design of the study was pre-test/post-test control group experimental design. The two dependent variables were the reading comprehension scores and the language processing scores. The independent variable was a teacher-made language processing strategy program. The subjects were assigned to either the control or experimental group by using matched scaled scores from the reading comprehension pre-test.

The experimental subjects were exposed to the intervention for 15-minute periods for a total of sixteen days by trained university students from a special education practicum class. The control subjects

were given instruction in various academic areas at the same time. At the end of the 3 week program, all subjects were post-tested in both reading comprehension and language processing and a t-test for related measures was performed using the gain scores between the pre- and post-test scores from the reading comprehension test and language processing test. Utilizing an alpha level of .05 with 8 df, no significance was found in either the reading comprehension ($t=.217$) or the language processing ability ($t=1.381$). The results of the study indicate a need for further research in the area of language processing and its relationship with academic learning. No conclusive results were derived from this particular study.

Dedication

I dedicate this thesis to my parents, Don and Jan Grewell, whose undying support and love throughout my years of growing up have made me the person that I am today. My strength and confidence to excel for the best that I can be was drawn from the two best role models that I could ever have emulated and for this I give them my thanks and my love.

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pathology classes, whose great assistance and cooperation in carrying out this study was truly appreciated.

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The Effects of Language Processing Strategies
Upon Reading Comprehension

Statement of the Problem

In 1975, the Education for All Handicapped Children Act was passed providing educational services and guidelines for children with special needs and exceptionalities. Specific learning disabilities was one of those identified exceptionalities. Specific learning disabilities was defined as:

A disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell or to do mathematical calculation . . . (Education for All Handicapped Children Act, 1975, p. 33).

This definition brought about closer scrutiny of language and how it may or may not effect academic behavior. Along with this scrutiny came a concerted effort to understand the development of language, the acquisition of language and its relationship with academic learning. Many findings showed a relationship between oral language and academic performance (Cartelli, 1977; Kinsbourne, 1974; Loban, 1969; Logan, 1963; Perfetti & Hogaboam, 1974; Wiig & Semel, 1975; & Wiig, LaPointe & Semel, 1975). Wallach & Liebergott (1984) in discussing the relationship between language and academics felt that the child's linguistic and

communicative abilities interacted with the content and structure of the curriculum.

Given that a relationship between language and academics has been established, a question arises as to whether the remediation of language deficits would then have a carry-over effect upon academic performance, particularly in the area of reading comprehension. This study addressed the supposition that if specific language skill deficit were remediated through direct oral instruction would this have a positive effect upon the level of comprehension of written materials.

Null Hypothesis

I. After a child has orally participated in and been exposed to a program of oral language processing strategies by trained personnel for 15 minutes a day, four days a week, during a period of three weeks, there will be no difference in student's language achievement as measured by the Clinical Evaluation of Language Functions, Diagnostic Battery (Semel-Mintz & Wiig, 1982).

II. After a child has orally participated in and been exposed to a program of oral language processing strategies by trained personnel for 15 minutes a day, four days a week, during a period of three weeks, there will be no difference in student's reading comprehension level as measured by the Stanford Diagnostic Reading Test (Karlsen, Madden & Gardner, 1974).

Review of the Literature

Past studies have shown the relationship between language proficiency and academic achievement and language proficiency and reading performance. The literature provides a definition of language and its terminology and gives an overview of the evolution of language. It also provides a review of reading performance and its relationship to language. The literature addresses the interrelationship between the processes of language and reading and how the two effect each other.

Language and Its Relationship to Academic and Reading Achievement

Prior to the passage of PL 94-142, a number of research findings supported the relationship between language development in children and subsequent academic achievement. Loban (1963) stated that those children found to be high in language ability were also high in reading ability and those children who were low in general language ability were low in reading ability. Loban (1969) supported his earlier findings in yet another study and found that outstanding readers and writers also excel on spoken language production. Kinsbourne (1974) found that children labeled learning disabled are often deficient in linguistic skills. With regard to reading disabilities, Perfetti and Hogaboam (1975) found children labeled reading disabled to be much slower on verbal labeling tasks when compared with the 'average' child. Levi, Capozzi, Fabrizi and Sechi (1962) found a positive

association between language disorders and reading disabilities. They found that at the age of six, those children who present semantic or syntactic difficulties in oral language will have reading difficulties.

Following PL 94-142, more research surfaced in support of the earlier findings and, in addition, brought out new relationships between the ability to use and comprehend oral language and academic behavior. Perfetti and Lesgold (1977) examined the relationship between reading skill and verbal encoding ability and concluded that the rate of access to information in long-term is an important source of individual differences in reading comprehension. In a research study conducted in a public school utilizing 192 kindergarten children, Seaton and Smith (1977) found that the experimental group of children who received direct instruction in language experience involving the areas of (a) verbal expression, (b) visual perception, (c) auditory perception, and (d) conceptualization scored significantly higher on the Preschool Language Scale (1975) and the Metropolitan Readiness Test (1976) than the control group who received an unstructured language experience. In a two year follow-up of those same children, Seaton and Smith (1977) found the experimental group to have scored significantly better on the Metropolitan Readiness Test (1976). Their results indicated that a systematic program of language development in early instructional programs should

increase reading achievement. In yet another study (Cartelli, 1977), a high positive relationship was shown to exist between paradigmatic language behavior and academic achievement. Paradigmatic behavior is the production of contrasts to the stimulus (e.g., up-down, high-low). Cartelli (1977) found that those children who were paradigmatic in thought were successful academically. His conclusion from the study indicated that paradigmatic language structures are inherent in the processes of learning to read and that paradigmatic language structures are critical behaviors necessary for achievement in learning any written code.

Strominger and Bashir (1977) conducted a nine-year follow-up study on children identified as having a language disability to see if subsequent problems in reading, spelling and writing would occur. Of the forty children utilized in the study, 38 were found to achieve below grade level on test scores in the areas of oral reading, reading comprehension and written language. A similar study, conducted over a four year span, found 80% of the 63 children who had been identified as having language disorders had persisting problems in speech and language and/or other academic problems (Aram & Nation, 1980).

In a fifteen-year follow-up with children identified as speech- and language-disordered, it was found that many of the 50 children used in the study had school problems of varying degrees

and types (King & Lasky, 1982). All of these related studies show a relationship between language and academic achievement.

One recent area of scrutiny within the realm of language skills is that of word-finding, which is the ability to retrieve and recall specific words for different language tasks. It has been found that adolescents identified as having language disorders or reading disabilities demonstrated word-finding problems when asked to name pictured objects, actions and attributes. These adolescents were found to make substitutions or were significantly slower in naming the objects (Wiig, LaPointe, & Semel, 1977; Wiig & Semel, 1975). Wiig, Semel and Nystrom (1982) also stated that word-finding difficulties may exist as an integral part of language disorder syndrome and that difficulties in different curricula related areas could be expected.

Lorsbach (1982) conducted a study that showed subjects labeled learning disabled categorized words less rapidly and recalled fewer words on a subsequent free recall task. Lorsbach (1982) suggested that semantic encoding and retrieval processes occur with less automaticity in children identified as learning and reading disabled. Less rapid and more inefficient use of the semantic content of words appears to be a contributing factor in the reduced performance on verbal learning tasks of children identified as learning disabled on verbal learning tasks.

Wiig and Semel (1980) summarize the effects of a language deficit with regard to the child's learning life by stating:

Language deficits which begin early in life . . . may persist into young adulthood and emerge again and again in later life. They tend to come out when new circumstances - perhaps a new line of study, a new job, or a promotion - place different and unexpected demands upon language processing and use in speaking or writing (p. 21).

A relationship has been established between language development and academic achievement. It has been shown that deficits in one or more areas of language can result in failure in academic areas, particularly reading. In order to fully understand the interplay between language and reading, an examination of each separate topic must be conducted.

Language

Bloom and Lahey (1978) define language as "a code whereby ideas about the world are represented through a conventional system of arbitrary signals used for communication" (p. 4). Based on this definition, Bloom and Lahey view language as a three-dimensional model in which all three of these dimensions interact simultaneously in the development of language.

The first of these dimensions, content, refers to the cognitive semantic development of language. Semantics refers to the study of the meaning of words and ways in which the meanings

change and develop (Crystal, 1976). The second dimension is concerned with language forms which include the coding rules for phonology, morphology and syntax. Phonology is the study of the smallest, meaningful units of language and syntax refers to word order and sentence structure (Crystal, 1976). The third dimension of language refers to use or pragmatics and deals with the function of language in its context.

These dimensions of language interact and develop simultaneously within the child. By the time the child reaches school-age, the acquisition of language has reached a fairly sophisticated level. According to Prutting (1979), by the age of three children can maintain a topic over adjacent successive utterances and their interactions begin to resemble adult conversations. Prutting further notes that the child is using new structures at the clause and phrase level in the acquisition of syntax and new structures at the word level in the acquisition of semantics. The sophistication of language acquisition of the beginning school-aged child allows for problem-solving in the academic areas. The child has developed the ability to not only produce words and sentences for communication but to also comprehend and make judgements about language and its use for learning. With language showing a relationship to academic learning (Cartelli, 1977; Kinsbourne, 1974; Loban, 1969; Loban, 1963; Perfetti & Hogaboam, 1975; Wiig & Semel, 1975 & Wiig,

LaPointe & Semel, 1975) a deficit or problem in language may cause problems in one or more of the academic areas.

Language and the study of language was not always viewed as three-dimensional with each dimension interacting simultaneously. Many early endeavors to describe language were concerned only with the form or structure of language (Muma, 1978; Van Hattum, 1979; and Wing, 1982). In addition to interests in language form, linguists became concerned with understanding the relationship between language competence and performance and the deep structure and surface structure of language (Cazden, 1971; Chomsky, 1957). Chomsky (1957) believes that the child could generate sentences without consciously knowing the rules of the language.

Following the study of language forms and deep and surface structure relationships, linguists began to examine not only the structure of language but also the semantics or meaning of language (Hodges & Rudorf, 1972; Muma, 1978). Linguists studying semantics state that the way to understand the development and the deficits of language in children is to describe how the child acquires meaning and relates meaning to the form system of language. Those concerned with the meaning of language were referred to as psycholinguists. Psycholinguists contributed to our knowledge of child language acquisition by emphasizing the meaning or semantic dimension of language.

As semantic relationships became clear, other researchers became interested in describing the social variables that influence language acquisition (Halliday, 1975; Hodges & Rudolf, 1972; Muma, 1978). This group was referred to as sociolinguists and they addressed the idea that the use, function or purpose of any word, phrase or sentence is as important as meaning and form.

Studies of form, meaning and pragmatics helped to bring about the viewpoint that language is three dimensional and that development in each dimension is necessary for normal language acquisition and subsequent use of language for learning. Research has indicated these dimensions of language are necessary for successful performance in the classroom (Cartelli, 1977; Kinsbourne, 1974; Loban, 1969, Loban, 1963; Perfetti & Hogaboam, 1975; Wiig & Semel, 1975; Wiig, LaPointe & Semel, 1975). Current research suggests that language must be described as a communication device and as a learning device. This need to describe and understand how language interacts with the learning of academic behavior brought about a new movement within the language field. This movement attempts to explain how language is processed in the learner. There are three models within this movement; (a) multi-store model; (b) levels-of-processing model; and (c) a combination model.

The multi-store model of processing focuses on the movement of information from the sensory stores through short-term and into

long-term or permanent store. Typically, short-term memory is thought to hold a small amount of information that is actively being analyzed, while long-term memory is a large body of information which is relatively permanently encoded (Anderson, 1980). This model is referred to as the "bottom-up" process (Duchan & Katz, 1983).

The multi-store model viewpoint states that, under certain circumstances, information must be processed through several steps and in several ways before it becomes influenced by higher level knowledge. It emphasizes the importance of processing the information contained in the acoustic signal prior to its linguistic interpretation. Support for this model found in fact that the incidence of auditory processing problems is high in children with language and learning problems and that working with them on auditory processing tasks can result in improvement in some of their higher-order learning and cognitive skills. In this model, rehearsal is viewed as just one of a number of strategies under the individual's conscious control (Butler, 1984). Rehearsal expedites the movement of information throughout the structural component of the memory system (Butler, 1984).

The second model is called the levels-of-processing model (Craik & Lockhart, 1972). This model hypothesizes that remembering information rests upon the depth (or level) to which incoming perceptual information was processed. First, you have

shallow processing. Secondly, this progressed to the semantic and abstract processing which is considered a "deeper" level. This model focuses upon the specific information which is to be processed and sees the processing stages as a series or hierarchy where greater 'depth' implies a greater degree of semantic or cognitive analysis. Analysis proceeds through a series of sensory stages to levels associated with matching or pattern recognition and finally to semantic-associative stages of stimulus enrichment (Norman, 1979).

Essentially, the levels-of-processing view is that language processing involves a guessing game in which the listener uses knowledge of the language and the world to make informed guesses about the speaker's message (Duchan & Katz, 1983). Processing of acoustical signals is also heavily influenced by the lexical and semantic knowledge of the perceiver. Familiar words are perceived faster and more accurately. High-order linguistic knowledge is used in processing phrase and sentence structures. In this model, both immediate and long-term memory are viewed as being not unstructured but organized linguistically and cognitively. This process is referred to as "top-down" processing (Duchan & Katz, 1983).

The third model is a combination of the first two and came through the work of Cromer (1981) and Wiig and Semel (1976). This model assumes that a child may have both auditory and language

processing problems and, therefore, it is necessary to deal with each type of problem independently. In other words, there are times when a child might process language through the "bottom-up" process and other times when language is processed through the "top-down" mode and each must be dealt with separately.

These models show the beginning of a different approach to the child with language and learning problems. More research is necessary to better understand the relationship between language and learning. The effects of training on language and/or learning remain unclear. An important research direction is to determine if there are differences in language and learning as a result of specified intervention activities.

Reading and Language

Since language was defined as a code, reading can be viewed as the process of breaking the code of the printed form of language. Similar to the dimensions in language reading can be viewed as falling into two major dimensions that comprise of learning printed language. The first dimension could be compared to the form dimension of language. It is referred to as a decoding process or the analytic approach, which is the learning of the visual code (Lapp & Flood, 1978). The visual code would consist of phonemes, morphemes and syntax and the rule structures appropriate to each form. The second dimension could be compared to the content dimension of language and is referred to as reading

for meaning or the wholistic approach. In this dimension of reading, the comprehension process is emphasized from the very earliest stages (Lapp & Flood, 1978).

Although there are differences of opinion about a precise definition of reading, most educators agree, at least, that the reading process includes: (a) letter and word recognition; (b) comprehension of the concepts conveyed by the printed word(s); and (c) reaction and assimilation of the new knowledge with readers past experience (Lapp & Flood, 1978). Language can be seen as playing an integral part of reading when viewing the process as containing the three aforementioned elements. Athey (1983) reinforces this relationship by stating, "Reading is an activity that involves extracting meaning from print and assimilating that meaning to one's existing store of information" (p. 198). Burke (1972) further states that one cannot teach reading as discrete parts. He believes the sequenced and systematic procedures which students are being taught do not function within the language process and that the relationship between language and reading was destroyed when they were separated (Burke, 1972). Mather (1972), in agreement with Burke, states that language acquisition is the most important prerequisite to reading. Waterhouse (1980), in correlating reading and language, approaches it from the language point of view and states:

Any theory of the relationship between thought and language bears on the question of reading. Reading requires language comprehension, some sort of semantic processing and the ability to understand the meaning of visual symbols which provides the form of language to be comprehended. As such, reading must involve both a particular type of language behavior and a special form of non-verbal thinking (p. 2).

A child's conceptual knowledge that gives one the ability to process written information encountered also enables the child to be more proficient and efficient at reading (Watson, 1973); therefore, development of language in young children serves as a foundation for reading (Smith, 1955). Reading requires both an implicit and explicit understanding of the language system (Wallach & Liebergott, 1984). Implicit language knowledge means the less conscious abstraction of phonological-syntactic-pragmatic rules during the various stages of language acquisition. Explicit language knowledge refers to conscious judgements and analysis of various aspects of language structure and various uses of language (Wallach & Liebergott, 1984).

Carroll (1970) reinforces the idea of both explicit and implicit understanding when he states: "In the process of reading you have not only recognized the words themselves but you have interpreted the words in their particular grammatical functions and . . . apprehended the general grammatical patterning of each

sentenceIn addition, you have given a 'semantic' interpretation of the sentence. . ." (p. 29). Carroll (1970), in reference to language and reading, breaks the reading process into several components; three of these components are: (a) the child must know the language that he/she is going to read; (b) the child must learn that printed words are signals for spoken words and that they have meaning analogous to those spoken words; and (c) the child must learn to reason and think about what he/she needs. Not all researchers agree that the language process and reading process are similar in the skills needed. Fischer (1980) states:

The development of skill in speaking and listening and in reading does not seem to involve similar processes. In learning language, the child only gradually attains awareness of the abstract rules used to describe the formal properties of his production. Ability to judge grammatically, or state linguistic rules, emerge gradually. Language acquisition is a process of going covert to overt Reading, in contrast, seems to be a quite different process. The child must take explicitly stated rules and internalize them. As reading becomes rapid and automatic, the rules become covert . . . (p. 35).

Though these researchers differ in terms of the skills needed for learning language and reading, they recognize that language does enter into the process of reading when utilizing

comprehension skills. After the child has acquired the skills needed to read, the correlation between reading and language increases. Barr (1972) states that after a child has had approximately four years of successful reading experience, correlation data show language facility (vocabulary and listening comprehension) to be even more highly related to reading.

As was stated earlier, the reading process can be categorized into two dimensions: (a) analytical and (b) wholistic. Each of these dimensions interacting with each other. While proponents of each of these dimensions may emphasize one dimension over the other, both are needed in order for the reading process to be complete. Menyuk (1983) states that both the decoding process and the comprehension process are necessary and summarizes the issue:

At the beginning stages of reading acquisition the material that children are required to read are usually simple sentences that are well within their level of syntactic and lexical knowledge. Thus, at the beginning stages of reading the principle requirement is translation of word orthography into phonological and semantic representations. However, after this task has been achieved the reference to lexical entries and sentence relations in the material are probably automatic since the words are well known and are in sentence structures that are well learned (p. 151).

One of the beginning steps in the decoding or analytic process of reading is to help the child in perceiving letters and letter patterns and help build an understanding that these units represent his/her familiar sound system (Ruddell & Bacon, 1972). Chalfant and Schefflin (1969) felt that beginning readers must learn a code of graphic representation for the earlier learned code of auditory language signals which the child learns to transfer to a set of graphic or printed language symbols. Chall (1983) concluded that children learned to read better and could read mature stories sooner if they were taught decoding skills during early stages of learning to read. According to Bernstein (1983) there is a growing consensus that fluent decoding is absolutely necessary for the development of mature and comprehending readers.

As the reader moves toward an interpretation of the sentence, after acquiring decoding skills, he/she begins to 'chunk' the words into larger units or phrases which are common in his/her developed oral language system (Ruddell & Bacon, 1972). These auditory language units are crucial to the reading process; auditory components are present in adult skills readers (Holmes & Singer, 1961). The auditory units develop into patterning skills and auditory patterning ability is related to reading comprehension (Sterritt & Rudnick, 1966). The mastery of decoding allows the child greater freedom to move towards the comprehension

of larger units which in turn leads to a greater comprehension of the entire sentence and passages.

Jones (1972), however, felt that reading is not all a visual process and that one merely uses a code for essentially auditory language; therefore, it is unlikely that a child who has poor comprehension of his own dialect can ever become a good reader. This then brings in to reading the second dimension; that of comprehension or the wholistic approach. Mattingly (1972) supports the wholistic approach by emphasizing that reading is a deliberately acquired language-based skill which is dependent upon the readers awareness of certain aspects of a primary linguistic activity.

When learning reading through the wholistic approach, the child must also be aware of the grammatical rules of language. It is this understanding of grammatical rules that allows the child to utilize all three levels of comprehension presented by Perfetti (1977). The three levels of comprehension are: (a) verbatim level in which the child glides across the sentence without getting into 'deeper' meaning; (b) basic-literal which involves the semantic-syntactic analysis of a sentence which requires more complex processing, and (c) constructive comprehension which requires that the child go on to obtain more information, integrating details, themes, character descriptions to answer questions appropriately. Ryan (1980) proposes that awareness of

the grammatical rules underlying language may be a prerequisite for attainment of reading proficiency. The structure of the written message must be analyzed deliberately before the intention can be extracted. Adult readers view reading as a process of extracting meaning; however, children may often react more on a rote level to the task. For young children with little ability to apply language strategies where meaning is not naturally and obviously apparent, more explicit instructions and more meaningful reading tasks may be required in order to elicit the appropriate strategies (Ryan, 1980).

The importance of instructing the child to gain awareness of grammatical functions within language and reading is crucial. K.S. Goodman (1972) states; "the task of reading depends largely on the processing of grammatical information. Whenever any language user attempts to derive meaning from language, he/she must treat it as grammatical sequences, and be aware of grammatical interdependencies" (p. 145). Y.M. Goodman (1972) supports this statement by saying that the grammatical system of a reader's language has great influence on the process of reading. Jenkinson (1969) believes that in the process of reading, the meanings of words, lexical, syntactical and structural, determine to a large extent what the reader can comprehend. Obviously, the ability to instill a strong grammatical understanding of language within the readers will have a positive effect upon the reader's

ability to comprehend or interpret correctly what it is the writer intended.

Goodman and Goodman (1972) believe that the reading process is a code which the child tries to break utilizing his/her own knowledge of the language system. K.S. Goodman (1972) believes that in order to understand how reading works one must understand how language works. He also views the clause as the significant unit in reading. He feels the reader must be aware what these clauses are in the 'deep structure' and be able to handle the form in which they are presented in the 'surface structure'.

Through this review, language has been shown to play an integral part within reading. Language has also been shown to have an effect upon academic achievement. Since language appears to play an integral part in academic learning, particularly in reading, then more research needs to be conducted to understand the ways in which a more complete language foundation can be instilled into the learner and also an understanding of the extent to which language does affect academic learning. The learner needs to be able to develop skills in language that allow him/her to understand and manipulate the language in its deeper structure, to be able to utilize language in its highest level of semantics and integrate it into the learners system.

The question arises as to whether one can actually teach language processing strategies directly to the learner or not. If

language deficits can be remediated, will they have a direct effect upon the academic success of the learner. The attempt of this study is to examine the relationship between language processing strategies and reading comprehension.

Method

Subjects

The subjects of this study were 18 children from rural communities in east central Illinois. The 14 males and 6 females, ranging in age from 7 years, 2 months to 12 years, 10 months, were voluntarily enrolled in a 4-week special needs summer program that was being offered through Eastern Illinois University's College of Education. The educational needs of the students enrolled in this program varied. Five of the subjects were identified as learning disabled and were receiving services in public schools during the regular school year. Two of the subjects were identified as educable mentally handicapped and were also receiving services in the public schools. Six other subjects were receiving Chapter I services in the school systems in either reading or math or both. The remaining five subjects were enrolled in the special need summer program because of a need for tutorial help in academic performance.

Design

This study was a pre-test/post-test control group experimental design. The two dependent variables of the design

were the subjects' reading comprehension scores and language processing scores. The independent variable or the intervention was a teacher-made language processing strategy program.

The subjects in the study were assigned to either the experimental or control group using a matching procedure. The criterion by which subjects were matched was the scaled scores from the reading comprehension section of the Stanford Diagnostic Reading Test (Karlsen: Madden & Gardner, 1974). Three levels of the test were used; red level for grades 1 through 3; green level for grades 4 and 5 and the brown level for grades 6 and 7. Scaled scores were utilized since these were the only scores that were comparable across all three levels (Table 1).

Insert Table 1 here

Once subjects were matched into the control or experimental group, they were then given a language assessment pre-test. The Clinical Evaluation of Language Functions, Diagnostic Battery (Semel-Mintz & Wiig, 1982) was used. Since the study was not concerned with the production aspect of language, only the processing section of the test was used. The raw scores were used for analysis as raw scores tend to be more sensitive to small changes than the other forms of scores. A t-test for related measures was used to determine significance at a .05 level of confidence for both the language and reading tests.

Table 1
Assignment of Subjects Using Matched Reading Scores

Control Group		Experimental Group	
Subject	Scaled Score	Subject	Scaled Score
S ₁	513	S ₁	531
S ₂	497	S ₂	486
S ₃	440	S ₃	460
S ₄	420	S ₄	435
S ₅	393	S ₅	398
S ₆	366	S ₆	374
S ₇	342	S ₇	341
S ₈	277	S ₈	305
S ₉	199	S ₉	199

Materials

The intervention for this study was a teacher-made language processing strategy program. The intervention in the program was chosen to approximate the skills tested by the Clinical Evaluation of Language Functions batter, language processing section. The activities were gathered from six different sources: Workbook for reasoning skills: Exercises for cognitive facilitation (Brubaker, 1982); H.E.L.P. - handbook for exercises for language processing, volumes 1 and 2 (Lazzari & Peters, 1980); Target on language (Novakovick, Smith & Teegarden, 1977) and M.E.E.R. - manual of exercises for expressive reasoning (Zachman, Jorgensen, Barrett, Huisingh & Sneed, 1982).

Directions for each of the activities were stated along with a behavioral statement of what was expected from the subjects. Each activity had possible answers provided so that no misinterpretation of subjects answers could occur. The program consisted of six strategies with a total of 19 activities that dealt with the areas of labeling, expressive functioning, categorization, expressive association, cause and effect and problem solving. These intervention activities were devised to be given orally with subjects' answers to be received orally (Table 2).

Insert Table 2 here

Table 2

Outline of Strategies in Intervention Program

- I. Labeling Activities
 - A. Labeling sets of words
 - B. Labeling objects by function
- II. Expressive Functioning
 - A. Stating functions
 - B. Naming objects when function given
- III. Categorization
 - A. List objects from a category group
 - B. Naming of items in category
- IV. Expressive Association
 - A. Completing incomplete phrases
 - B. Providing final missing nouns
 - C. Completing phrase containing preposition/conjunction
 - D. Providing noun in sentence
 - E. Identifying object by definition
 - F. Completing proverbs
 - G. Completing If/then proverbs
 - H. Providing logical explanations
 - I. Completing analogies
- V. Cause and Effect
 - A. Identifying possible causes
 - B. Identifying possible solutions
- VI. Problem Solving
 - A. Identifying problem by solution
 - B. Stating solution to problem

Treatment and Training

University students from a methods class in learning disabilities provided the intervention to the subjects in the experimental group. A 1-hour training session on the language processing program was provided. This training consisted of information concerning supportive research on the relationship between language processing and academic achievement and an explanation of the purpose of the program. Following this introduction, explanation and directions given on the use of the language processing program. Finally, the students were paired up and given 30-40 minutes to practice using the program with supervision. Students had an opportunity to practice each section so that any questions or difficulties that might arise could be answered. Following this training, the method students were assigned to either a control or experimental subject. Sixteen of the method students were assigned to a single subject, while 4 of the method students were each assigned to work with 2 subjects.

Over the period of 4 weeks, the subjects in the experimental group participated in a total of sixteen 15-minute sessions from the language processing strategy program. The purpose of each session was to provide the opportunity for each subject in the experimental group to receive exposure to a comparable number of language processing strategies. Exposure rather than mastery was chosen due to the wide range of abilities of the subject and to

control for the number of strategies to which each subject was presented. During the same time period, subjects in the control group received academic assistance in their individual deficit areas ranging from phonetic analysis to mathematical computations. On the final day of the fourth week of the summer school program, all subjects were post-tested in both reading comprehension and language processing ability. Once again, the Stanford Diagnostic Reading Test and the Clinical Evaluation of Language Functions were used.

Analysis of Data

The scaled scores from the reading comprehension pre-test and post-test were tabulated and then subtracted from each other to obtain a gain score. The same procedure was used with the language processing pre-test and post-test scores (Table 3).

Insert Table 3 here

After a gain score for each subject on each test was calculated, a t-test for related measures was conducted to test for significant at a .05 level.

According to the t-test analysis, no significant difference at the .05 level of confidence was found in the gain scores of reading comprehension between the control or experimental groups ($t=.217$). Similarly, the t-test analysis resulted in no

Table 3
Pre-test and Post-test Scores

Control Group				Experimental Group			
Subjects	Pre- test	Post- Test	Difference	Subjects	Pre- test	Post- Test	Difference
S ₁	513	500	-13	S ₁	531	575	+44
S ₂	497	486	-11	S ₂	486	472	-14
S ₃	440	450	+10	S ₃	460	432	-28
S ₄	420	429	+9	S ₄	435	429	-6
S ₅	393	422	+29	S ₅	398	398	0
S ₆	366	360	-6	S ₆	374	398	+24
S ₇	342	366	+24	S ₇	341	369	+28
S ₈	277	275	-2	S ₈	305	287	-18
S ₉	199	244	<u>+45</u>	S ₉	199	239	<u>+40</u>
			+85				+70
			X=9.44				X=7.78

Table 3
Pre-test and Post-test Scores

Language Processing				Language Processing			
Control Group				Experimental Group			
Subjects	Pre- test	Post- Test	Difference	Subjects	Pre- test	Post- Test	Difference
S ₁	186	238	+52	S ₁	248	249	+1
S ₂	255	246	-9	S ₂	240	247	+7
S ₃	191	190	-1	S ₃	200	240	+40
S ₄	225	211	-14	S ₄	225	208	+3
S ₅	188	209	+21	S ₅	204	207	+3
S ₆	193	173	-20	S ₆	154	206	+52
S ₇	206	208	+2	S ₇	147	146	-1
S ₈	148	140	-8	S ₈	140	159	+20
S ₉	130	126	<u>-4</u>	S ₉	144	159	<u>+15</u>
			+19				+120
			X-2.1				X=13.33

significant difference at the .05 level of confidence in gain scores for the language processing between the control or experimental group ($t=1.38$). Thus, both null hypothesis were accepted.

Results and Discussions

While no significant difference was found in the gain scores of either tests, it should be noted that the experimental group's scores on the language test showed a trend toward a higher incidence of positive scores when compared to the scores of the control group. When a language processing mean score was tabulated for the control and experimental group, the experimental group shows a mean score of 13.3; whereas, the control group shows a mean score of 2.1. Both trends tend to indicate that given a longer period of intervention, the difference between the language processing gain score in the experimental and control group may have been significant.

It is difficult at this point in time to draw conclusive results from this study due to a number of factors that could have contributed to the lack of significance between the control group and experimental group's gain scores. One such factor, which was referred to earlier, was the shortness of time in which the intervention took place. Sixteen days of intervention in which to show a significant change in subject's test scores was not an adequate amount of time. Another contributing factor, closely

related to the first factor, is the intensity of the intervention. Fifteen minutes a day for 4 days a week may not be adequate. However, this point needs to be carefully considered when dealing with different age groups. It was noted by the interventionists that the first and second graders became frustrated and restless during the 15-minute time span but the older subjects did not experience such a reaction.

Several other contributing factors which could have effected the results dealt with the post-testing procedures. The reading comprehension pre-test was conducted by a single tester in one location who administered the test in a group setting. This, however, was not true for the post-testing. During the post-testing, only the first, second and third graders were given the test in a group situation in a single room by one tester; the other subjects were administered the test by their assigned method students. The subjects were also located in several rooms in which other subjects, who were not taking the test, were working. This difference in the pre-testing and post-testing conditions may have effected the subjects scores in a number of ways: (a) the interaction between the method student and the subject could have been different, either positively or negatively, than that of the single tester in the pre-testing situation; (b) the distraction of other students in the room could have affected the test taking; (c) the noise level could have interfered with the testing; and

(d) the difference in the way in which each method students administered the reading post-test might affect the scores.

Another difficulty arising with the post-test was the fact that it took place on the last day of the program while many other activities were being culminated; such as, art projects, the handing out of awards and the finishing up of subject's activity books. Each of these activities were very rewarding to the students and tended to cause them to be resistant to leaving so that administration of the post-tests could occur. Also, because it was the last day the methods' students had activities of their own to finish. All of these activities tended to create a rushed atmosphere and may have contributed to and effected the subjects' post-test scores.

Two final conditions which may have acted as confounding factors were the proximity of the control and experimental subjects and the lack of consistency in the starting times of the language processing program. The proximity of the control subjects and the experimental subjects presented a problem in that there were several control subjects who were within hearing distance of the experimental subjects as they were participating in the language processing program. This closeness allowed for the control subjects to be exposed to the intervention and this may have affected the post-testing scores. The lack of consistent starting times for intervention of the language processing program

may have also confounded the situation. Due to various circumstances, the methods students were often unable to begin the language processing program at the exact times. Sometimes, there was as much as a half an hour difference between the starting times. This inconsistency made it impossible to control for events that might have occurred during that time lapse that could affect the subjects or the participation in the language processing program.

Recommendations

The results of this study have not shown conclusively that the language processing strategy program is ineffective. However, it has shown a need for further research. More research needs to be done with a larger population while eliminating some of the aforementioned factors which may have effected this study. While the question of whether or not language processing has a direct correlation with reading comprehension has not been adequately answered in this study, it is still a vital research topic given the current focus of research in this area. Several recommendations need to be made in order to ensure a more conclusive study.

1. Any future study needs to allow for a longer time in which the intervention can occur so that any changes in subjects' reading comprehension and/or language processing skills will be great enough to show a significant difference using the selected evaluation materials.

2. The intensity of the intervention should be increased from 15 minutes to twenty minutes. In doing so, the ages of the subjects need to be taken into consideration, if the subjects are in the first or second grades or tend to have short attention spans, it is recommended that the time element be divided into two 10-minute sessions taking place at the beginning and the end of the instructional period. If, however, the subject is in the intermediate grades or has an adequate attention span, then it is recommended that the subject participate in the language program for the full twenty minutes.
3. Consistency between the pre-testing and post-testing situations need to be maintained. Pre-tests and post-tests should be conducted by the same administrator. Additionally, the conditions with the pre- and post-testing situations should be free of visual and auditory distractions and should be scheduled so that adequate time and space is allotted to create a more relaxed testing situation. Also, subjects should be tested as a group.
4. To ensure that the control subjects are not exposed to or likely to be exposed to the language processing program, it is recommended that the control subjects be removed from the room in which the experimental subjects are participating in the language processing program.

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